

DISCUSSION OF THE AMENDMENT

Claims 1-2, 4-13, 15-16, 18-19 and 26-31 are active in the present application. Claims 29-31 are new claims. Support for the new claims is found on lines 2 and 3 on page 9 in the specification. Claims 3, 14, 17 and 20-25 are canceled claims. Claims 8-11 are currently withdrawn from active prosecution. Claim 7 is amended for matters of form.

No new matter is added.

### REMARKS

Applicants thank the Office for withdrawing the rejections previously of record in the present application.

The Office has now rejected the claims over a combination of Tsuji (US 6,524,668), Sarno (US 4,403,955), and Hill (US 2,947,114). The Office acknowledges that the primary reference, i.e., Tsuji, does not disclose at least those requirements of the claims relating to the dimensional characteristics of the fine grooves that are present on the outer surface of the silica glass crucible of the claimed invention. The Office relies on Hill and Sarno to cure this deficiency of Tsuji.

Applicants point out that the combination of prior art references now cited by the Office fails to disclose the dimensional characteristics of the fine grooves recited in the present claims. Thus, the prior art relied on by the Office does not disclose all of the present claim limitations.

It appears that the Office is asserting that one or more of the prior art references discloses that the outer surface of a crucible may be roughened and it would be obvious to optimize such roughening to arrive at the crucible of the claimed invention.

First, the prior art relied on by the Office, i.e., Tsuji, Sarno and Hill, does not teach one of ordinary skill in the art how to form fine grooves having the dimensional characteristics recited in the present claims. The prior art cannot render the presently claimed invention obvious merely because the prior art discloses that crucibles can be roughened. The prior art has to teach those of ordinary skill in the art how to arrive at a crucible having fine grooves of the dimensional characteristics recited in the present claims. Applicants submit that the prior art relied on by the Office would not enable one of ordinary skill in the art to prepare a crucible having an outer surface having fine grooves with the dimensional characteristics of the fine grooves recited in the present claims.

On this basis alone, Applicants submit the rejection is not supportable and should be withdrawn.

The rejection fails for other reasons. For example, one of ordinary skill in the art would have no motivation to combine Hill with Sarno or Tsuji. Hill makes it very clear that the prior art crucible must be one that is “substantially free of silica compounds” (see col. 2, lines 26-27 of Hill). In fact, the crucible of Hill is a metal crucible that may have a refractory oxide layer. However, as is explicitly disclosed in Hill, such a crucible must not contain silica. This is directly contradictory to the presently claimed invention, i.e., a silica glass crucible.

Hill teaches away from the presently claimed invention by stating that the prior art crucible must be substantially free of silicon compounds. Those of ordinary skill in the art would not be motivated to combine Hill with any of Tsuji and Sarno, and in fact, the prior art relied on by the Office teaches away from such a combination. The rejection is thus not supportable and should be withdrawn.

Further with respect to the Office’s rationale for combining the reference, the Office states:

...it would have been obvious to one having ordinary skill in the art at the time of the applicant’s invention that Tsuji’s (668) silica glass crucible would either have the above surface properties as taught by Sarno (955) or it would have been obvious to one having ordinary skill in the art at the time applicant’s invention was made, through routine optimization, to roughen the outer surface of Tsuji (668) as taught by Hill (114) in order to provide the above surface properties for adhering the members together.

It appears that the Office is rationalizing that one of ordinary skill in the art would arrive at the presently claimed invention by modifying the surface of the silica glass crucible of the prior art. However, this is directly contradictory to the teaching of Sarno where, at

best, it is taught that the surface roughness of the glass crucible is accommodated by changing the surface roughness properties of the carbon receptacle, not the glass crucible:

The segmented receptacle 10 [i.e., the graphite portion of the Sarno device] can have its segments 11 adjusted to accommodate any roughness, or unevenness of the crucible 12 [i.e., the prior art quartz crucible] without creating stress points that may cause breakage of both the crucible 12 and the receptacle 10 during a normal melt process in growing crystals.

See column 3, lines 36-41 of Sarno (underlining added).

Therefore, contrary to the Office's assertion that the prior art teaches optimization of the surface roughness properties of the prior art silica glass crucible, the prior art actually teaches optimizing the surface properties of the carbon receptacle in order to accommodate the roughness of the prior art silica glass crucible surface. The Office's basis for the rejection is therefore further contradicted by the cited prior art.

Moreover, the surface roughness properties of the crucible of Tsuji are substantially different than the surface roughness properties required of the silicon crucible of the claimed invention. Tsuji discloses:

In concrete terms, it is appropriate that an average roughness (an arithmetic average roughness) of the surface jointed with the quartz glass of the inner layer being 0.1-1.0mm and that an average distance of concave and convex parts being 0.2-5mm. If the surface being so, melted glass can enter among carbon fibers to obtain a composite crucible having high joint strength.

See col. 4, lines 6-12 of Tsuji.

Tsuji describes the surface properties of the carbon receptacle of the Tsuji device. The Tsuji carbon receptacle acts as a mold for the surface of the silica which is fused in the presence of the prior art carbon receptacle (see col. 4, lines 35-56 of Tsuji). There is no suggestion or disclosure in Tsuji to form a silica glass crucible having the surface features recited in the present claims. In fact, Tsuji discloses surface features that are many orders of

magnitude larger than the surface features of the fine grooves of the presently claimed invention. Nowhere does Tsuji suggest the fine grooves recited in the present claims.

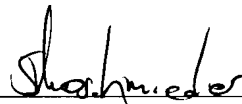
The average roughness of the Tsuji silica surface is caused by the surface of the Tsuji carbon receptacle. The Tsuji silica surface therefore has an average roughness of 0.1-1.0mm, contradictory to, for example, Claim 5 wherein the number of projections having a height of 0.1mm or more is an average of less than 5 per unit area on the outer surface of the crucible. Applicants thus submit that the surface features of the silica crucible of Tsuji are substantially larger than the fine grooves recited in the present claims. Tsuji does not suggest any modification of the prior art silica surface to form the features recited in the present claims.

For the reasons discussed above in detail including (1) Hill's teaching that silica compounds should be excluded from crucibles, (2) Sarno's teaching that the surface of the carbon receptacle, not the surface of the silica crucible, may be optimized, and (3) the failure of any of the prior art to disclose or suggest surface features having the dimensional characteristics of the present claims, the rejection of the present claims as obvious over the cited prior art is not supportable and should be withdrawn.

For the reasons discussed above in detail, Applicants submit that all now-pending claims are in condition for allowance. Applicants request the withdrawal of the rejections and the mailing of a Notice of Allowance acknowledging the patentability of the presently claimed subject matter.

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